

Application Serial No. 10/560,804  
Reply to Office Action of January 2, 2009

PATENT  
Docket: CU-4560

Rejections under 35 U.S.C. §103(a)

Claims 1-7, 11-40 and 45-63 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kametani et al. (US 5,032,176) in view of Murphy et al. (Equilibrium Calculation of the Reduction of Titanium Tetrachloride by Aluminum and Hydrogen, High Temp. Chem. Processes 3, August 1994, p. 365-374). Claims 8-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kametani et al. in view of Murphy et al. and O'Donnell et al. (US 5,397,375). Applicant respectfully disagrees with and traverses these rejections.

Applicant respectfully submits that the Office Action has mischaracterized the teachings of Kametani et al. The Office Action appears to be relying on one possible grammatical interpretation of the sentence between lines 10 and 16 in column 12 to come to the conclusion that Kametani et al. suggests using aluminium as a reducing agent. Applicant respectfully asserts that this conclusion is completely inconsistent with the disclosure throughout the remainder of Kametani et al. Kametani et al. does not describe the use of aluminium for reducing  $\text{TiCl}_4$ , but teaches, without ambiguity, that magnesium or sodium are the reducing agents (see, for example, lines 51 to 54 in column 4, lines 33 to 42 in column 7, lines 28 to 36 in column 9, lines 25 to 33 and lines 58 to 65 in column 12, etc.).

Applicant respectfully asserts that Kametani et al. neither explicitly, implicitly or inherently teaches nor suggests the step of reducing titanium chloride with aluminium. Moreover, Applicant asserts that one of ordinary skill in the art would understand that any aluminium used in the method of Kametani et al. would not act as a reducing agent because of the higher reactivity of sodium and magnesium. Indeed, calculations performed by the inventor of the present application (and described in the attached Declaration of Dr. Haidar) confirmed the inventor's preliminary opinion that aluminium will not reduce  $\text{TiCl}_4$  in the presence of sodium or magnesium.

Kametani et al. teaches that aluminium is one suitable metal that can be mixed with a reducing agent (i.e. magnesium or sodium) to form a titanium alloy article, which comprises titanium and aluminium. Kametani et al. also teaches that zinc or tin are other suitable metals that can be mixed with magnesium or sodium to form a titanium alloy article comprising titanium and zinc or tin. As noted in the attached Declaration of

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Dr Haidar, the aluminium is conserved (i.e. not reduced) throughout the process of Kametani et al. in order to produce the titanium-aluminium composite powder. Furthermore, the presence of excess aluminium will not cause it to react with  $\text{TiCl}_4$ , as noted in Dr Haidar's Declaration.

To support a *prima facie* case of obviousness, the Office Action must establish "a finding that the prior art included each element claimed, although not necessarily in a single prior art reference, with the only difference between the claimed invention and the prior art being the lack of actual combination of the elements in a single prior art reference." Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in view of *KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg. 57,526 (Oct. 10, 2007).

Applicant respectfully asserts that a *prima facie* case of obviousness cannot be established because Kametani et al. does not teach or suggest the step of reducing titanium chloride with aluminium. The aluminium taught in Kametani et al. would not perform the step of reducing titanium chloride because of the higher reactivity of sodium and magnesium.

In light of the foregoing, Applicant asserts that it is similarly not appropriate to conclude that titanium subchlorides and  $\text{AlCl}_3$  would inherently be present as the products of a "first step" of Kametani et al., because if any aluminium is used in the method of Kametani et al., it is not reduced but is incorporated into the titanium-aluminium composite powder.

Accordingly, Applicant respectfully asserts that Kametani et al. does not teach or suggest a two step method for forming titanium-aluminium compounds or alloys in accordance with the method of the present invention, let alone that such a method could be used to controllably produce titanium-aluminium compounds.

Murphy et al. describes the results of calculations for assessing the feasibility of titanium production processes involving the reduction of titanium tetrachloride with hydrogen or aluminium. Applicant respectfully asserts that these calculations are not relevant to the method of Kametani et al., because they do not relate to the reduction of  $\text{TiCl}_4$  with sodium or magnesium. Applicant further submits that these calculations require experimental conditions, which are in no way applicable to the systems disclosed in Kametani et al. Accordingly, Applicant respectfully asserts that one of

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ordinary skill in the art would have absolutely no motivation or expectation of success in combining the teachings of Murphy et al with Kametani et al. This is because the aluminium optionally used in the method of Kametani et al. is not used to reduce  $TiCl_4$ , and because of the extreme differences in reaction conditions described in Kametani et al. and Murphy et al. The attached Declarations from the inventor, as well as the author of Murphy et al., confirm these assertions.

Accordingly, Applicant respectfully requests withdrawal of the present rejections under 35 U.S.C. §103(a).

In light of the foregoing response, all the outstanding objections and rejections are considered overcome. Applicant respectfully submits that this application should now be in condition for allowance and respectfully requests favorable consideration.

Respectfully submitted,

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